

## **AGRICULTURAL ACCIDENTS AND ILLNESS AMONG CALIFORNIA WORKERS' COMPENSATION CLAIMANTS**



*By David F. Goldsmith, Ph.D., James J. Beaumont, Ph.D.  
Lynne A. Morrin, B.S., Marc B. Schenker, M.D., M.P.H.  
University of California, Davis, California*

Agriculture has equalled mining as the most hazardous industry in the U.S. As part of the University of California Davis Center for Agricultural Health and Safety, epidemiologists are examining California Workers' Compensation (WC) Appeals Board claims to describe the accident and illness risks among farm employees. Preliminary findings of 80 claimants who filed between 1946 to 1964 show that all were farm workers (not farmers), and about 90 percent were white or Hispanic males with a mean age of 46 years of age. Of the 27 respiratory disease claims, 14 percent filed because they had valley fever (coccidiomycosis), 27 percent had other (mostly chronic) respiratory illness, 41 percent filed because of pesticide illnesses, and 18 percent filed because of multiple effects of inhaled toxic materials, i.e., solvents and agricultural burning. Among the 53 farm laborers filing WC accident claims, 11 percent were for hernias, 20 percent were for fractures, 18 percent were for contusions and other wounds, and 52 percent were for traumatic injuries. Follow-up proportionate mortality ratio (PMR) analysis from 1950 to 1984 of the injury claimants employed in agriculture indicated that these farm workers have an elevated risk for malignant neoplasms of lung (PMR = 2.39), for vascular lesions of the central nervous system (PMR = 2.95), and for all external deaths (PMR = 1.95) when compared to U.S. white males. This preliminary study demonstrates that WC data are extremely useful to describe illness and injury patterns among agricultural workers. Furthermore, the mortality findings suggest that there is an elevated risk of lung cancer, stroke, and external causes even after injury claims are filed. New epidemiologic research is needed to elucidate the risk factors for the excess rate of occupational injury and death now being observed in the agricultural workplace.

## VISUAL MATERIAL FOR PESTICIDE SAFETY LESSONS FROM AN ECUADORAN EDUCATIONAL INTERVENTION



*By James I. Grieshop, Ph.D.*  
University of California, Davis, California

Throughout the world in developing countries such as Ecuador, efforts to transfer technologies have not occurred without serious problems. This is true in the agricultural sector where pesticides have rapidly come into widespread use in areas where traditional agriculture had been practiced. However, the transfer of pesticide technology has not been accompanied by the transfer of techniques for their safe, effective and appropriate use, thereby leading to human health problems (poisoning) and environmental damage and serious and justifiable public concern. In countries such as Ecuador, users of pesticides often are illiterate, and live in isolated areas. These attributes present particular problems for designers of education and communication programs. Folk beliefs in relation to pesticides and personal risk also work against the effectiveness of communication programs. This poster demonstrated the potential for the use of visual materials, including symbols and pictographs and more highly refined materials such as photo-novels and posters, for communicating messages about safe and appropriate use of pesticides. The materials to be highlighted are the products of intensive field research, primarily in Ecuador, on users of agricultural chemicals. The poster session will demonstrate the evolution of these materials from relatively simple symbols and pictographs to much more complex photo-novels and posters and materials developed for use with both Spanish-speaking and Quechua-speaking rural residents. The relationship of field research using qualitative approaches and the development of these visual materials will also be a key feature of this graphic information session. Lessons from these field-based experiments provide lessons for the development of similar health education interventions in the United States with non-English speaking and reading farm laborer audiences.

**THE U. C. DAVIS AGRICULTURAL HEALTH AND SAFETY  
CENTER: A MULTIDISCIPLINARY CENTER FOR RESEARCH AND  
OUTREACH**



*By Marc B. Schenker, M.D., M.P.H.*  
University of California, Davis, California

California is the leading agricultural state in the nation, with 16 percent of all U.S. crop production, as measured by farm cash receipts. Farm production in California is 60 percent greater than the second leading state. A review of agricultural production statistics documents the enormous size and importance of California commodities. For example, California produces 39 percent of all U.S. vegetables and melons, 53 percent of all fruits, nuts and berries, and 24 percent of all nursery and greenhouse products. More than 1,000,000 workers are employed annually in agriculture in California, and there are more than 20,000 disabling injuries per year in the state. The purpose of the new U.C. Davis Agricultural Health and Safety Center is to create a multidisciplinary organization for communication and coordination of research, education, and illness and injury prevention in the agricultural workplace. The Center will address occupational and environmental health issues affecting farmers, ranchers, agricultural employees, farm families, agricultural service employees and visitors and residents around agricultural work sites. The Center includes multiple academic units within the University of California, as well as participation by programs and state agencies from outside the University and interactions from neighboring states. As one of two national centers funded by NIOSH, the U.C. Davis Center will focus on agricultural health and safety issues most relevant to the western states. The Center is organized into an administrative core and a research and an outreach component. Participants from U.C. Davis, U.C. Berkeley, various state agencies and agriculture organizations are actively involved in both the research and outreach components. This mixture of the unique expertise of the participants, the diverse resources of the University and the State of California, and the contacts and involvement of state agricultural organizations provides an outstanding and unique environment for addressing the health and safety hazards in agriculture.

## CALIFORNIA AGRICULTURAL HEALTH AND SAFETY PROMOTION SYSTEM

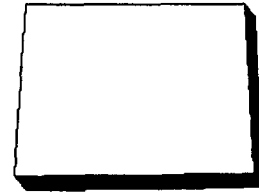


*By William E. Steinke, Ph.D.*  
University of California, Davis, California

The California Agricultural Health and Safety Promotion System (CAHSPS) addresses the need for training across the diversity of California agriculture (more than 250 commercial commodities workforce through several actions). Many farm workers in California are Hispanic and have a limited ability to communicate in English. Several other ethnic groups, i.e., Hmong, Mexican Indian, Vietnamese, Filipino, American Indian, Japanese and Chinese, are also present in the agriculture workforce in large numbers. The CAHSPS addresses the educational needs regarding safety in six major program areas. First, a pilot program is being established to develop training materials and training methodologies for growers, field supervisors, farm labor contractors and others to use in providing regular and focused safety training for those exposed to the hazards of agriculture. Second, a formal and rigorous evaluation of the effectiveness of this type of training is being independently conducted. The third component features grants that are being offered to ten community agencies for programs that use channels outside the work place to distribute agricultural occupational safety and health information. The fourth aspect, which includes data collection regarding causes of fatalities and cases of major trauma, is being undertaken in collaboration with the State Department of Health Services. As the fifth aspect, an evaluation of different levels of safety training as they currently are practiced on California farms is being conducted, with the goal of identifying the key components crucial to a successful program. The sixth component is development of coursework in the College of Agricultural and Environmental Sciences regarding agricultural occupational safety and health and injury and illness prevention programs. The results of this program will make working in California less hazardous and enable growers to customize their safety programs and training to fit the needs of their operations and employees.

## PROMOTING AGRICULTURAL SAFETY AND HEALTH IN COLORADO

By Paul D. Ayers, Ph.D.  
Colorado State University Fort Collins, Colorado



Agricultural production in Colorado is an extremely hazardous occupation. Many fatalities, injuries and illnesses can be prevented through education. Colorado State University Cooperative Extension has embarked upon such an educational program through a grant provided by the National Institute for Occupational Safety and Health. This grant provides funding for several safety projects including the following topics:

- An up-to-date resource library containing visual aids and literature has been established and made available to all 58 county Cooperative Extension Offices. A monthly safety newsletter sent to each Cooperative Extension Office has been implemented as well as news releases submitted to Colorado's major agricultural publications. County Extension personnel are in a good position to disseminate safety information to a variety of individuals through their various production meetings.
- Tractor safety, particularly tractor roll-overs, is always a major concern. Older tractors without roll-over protection (ROPS) are especially hazardous in a farm situation. Colorado State is conducting a tractor survey to determine the number of tractors without ROPS. Tractor survey forms were sent out to 1,000 farmers via the County Cooperative Extension Offices to ascertain the safety equipment available on tractors currently being used. Information from this survey will be used to determine areas needing more emphasis such as seat belts and roll-over protective structures.
- Pesticide safety is another major concern for Colorado agricultural workers. Protection of the applicator can be greatly increased through usage of gloves and respirators. These two simple items can be easily implemented into the pesticide application operation. County Extension Offices have been provided with a chemical safety kit which includes gloves, coveralls, goggles, overshoes, respirators, etc. for demonstration purposes at meetings and field days. Gloves are also provided at pesticide applicator meetings for each participant completing the course.

Each office has also been provided with a video tape on farm chemical safety. Disposal of agricultural hazardous wastes (unusable pesticides and containers) is a continuous problem. Steps are being taken to provide guidelines for disposal of such items on a local level for agricultural workers. The intent of the Colorado State project is to educate Cooperative Extension personnel about various safety programs so they, in turn, can educate their clientele. In this manner, more agricultural workers can be reached on a statewide basis.

## INJURY RISK-TAKING BEHAVIOR OF FARM YOUTH

*By Robert A. Aherin, Ph.D.*  
University of Illinois, Urbana, Illinois



Various state farm accident studies have consistently found a high incidence of farm-related injuries occurring to children under the age of 15. In an effort to gain a better understanding of the types of behaviors being performed by children on farms, a study was conducted to evaluate parental attitudes and behaviors regarding three farm machinery-related behaviors. A sample of 377 randomly selected farm families, who had children 15 years of age and younger, participated in the study. The three behaviors evaluated included: 1) Riding on a tractor with a parent during the past 12 months; 2) Operating a tractor; and 3) Allowing the child to be within 10 feet of rotating or revolving components on farm machinery. Twenty-nine percent of the parents felt it was acceptable to allow children 3 years of age and younger to ride on a tractor with them. Sixty-five percent agreed that children between the ages of 4 to 6 years of age should be allowed to perform the behavior. Nearly 90 percent of the parents allowed their 7-to 9-year-old children to ride on tractors. More than 70 percent of all the parents believe the risk of injury for performing this behavior was low. Twenty-nine percent of the farm boys in the study were allowed to operate tractors. Sixty-seven percent of 10-to 12-year-old boys and almost all of the 13-to 15-year-old boys operated tractors. Girls operated tractors significantly less than boys. Only 16 percent of parents thought their children between 7 to 9 years should be allowed to be within 10 feet of rotating farm machinery parts. However, 27 percent allowed their boys in this age group to perform the behavior. Of the 377 families who completed the survey instrument, 16 or 4.2 percent reported an accident. The injuries from these accidents resulted in 75 percent of the victims needing to seek medical attention while approximately 12 percent were permanently disabled. As a result of these findings, an educational program has been developed to assist farm families with their understanding of the behavioral and physical limitations of children to deal with injury risk associated with farm equipment.

**REDUCING THE POTENTIAL FOR ENVIRONMENTAL  
EXPOSURE AND HUMAN EXPOSURE TO PESTICIDES—  
A SELF-HELP WORKSHOP FOR PRODUCERS**

*By Richard O. Pope*  
Iowa State University, Ames, Iowa  
*George F. Czapar*  
University of Illinois, Springfield, Illinois



Public concern about groundwater contamination from agricultural practices remains high. Recent midwest well water surveys have helped define the extent and frequency of water contamination. In addition to pesticide mixing and handling practices, well construction, depth and location are known to affect water quality. Farm\*A\*Syst is a prototype 12-part agricultural farmstead assessment program, developed in 1990 by United States E.P.A. Region 5, and the Extension Services of the Universities of Wisconsin and Minnesota. From this prototype, a specific program was developed for use in Iowa County pesticide—certification training sessions. The primary focus of this program is to raise producer awareness and outline recommended pesticide management practices. This interactive worksheet enables each producer to examine and improve his or her individual management practices. Results compiled from initial workshop evaluations will be discussed. This producer feedback is being used to assist program planning for inter-agency water protection efforts.

## A THEORETICAL FRAMEWORK FOR SAFETY BEHAVIOR INTERVENTIONS

*By James Westaby, Graduate Assistant, Robert Aherin, Ph.D.  
University of Illinois, Urbana, Illinois*



Occupational injuries and illnesses are a serious threat to farmers. Many farm injuries and illnesses are the result of dangerous behavior. Reducing injury risk on the farm is a considerable task because many farmers are autonomous and self-motivated. Many farm safety programs have been implemented, but have not undergone systematic evaluation. It is unclear whether these programs actually reduce injury risk. Also, many programs lack theoretical rationale for their interventions. A theoretical approach to reduce injury risk by targeting specific unsafe behaviors is proposed. Empirically supported theories, such as the Theory of Reasoned Action, Theory of Interpersonal Behavior, and the Theory of Planned Behavior are used in the proposed framework. The framework identifies factors that determine behavior. For example, it has been shown that specific behaviors are determined by specific behavioral intentions and/or habit processes. Behavioral intentions, in turn, are determined by the attitudes people have toward the behaviors and their subjective norms (i.e., the pressure people feel from significant others to perform the behavior). The framework, in sum, should help pinpoint reasons why farm workers perform unsafe behaviors, target those behaviors with specific safety interventions, and show which strategies prove effective. Effective strategies, in turn, could be modelled in large-scale safety programs. More confidence could be placed in such validated programs.

## SAFE COUNTRY

*By James L. Williams  
Country Companies, Bloomington, Illinois*



Background: Prior to developing this educational program on farm safety, research was conducted with 1,500 agricultural producers. Research indicated the need for an educational program, including a video.

The final educational package consists of:

1. Leaders' Guide;
2. An 18-minute video;
3. Modules on: Tractor and machinery safety, plus general farm safety and health; chemicals; animals; ladders; and harvest safety
4. Student booklets; and
5. Promotional material, including news releases, posters and a promotional brochure.

Comments to date indicate its progress is well received. Approximately 3,000 pieces of student materials have been shipped, indicating excellent usage of the program. It is in use in four states by the Country Companies and other agriculture interested organizations.



## FARM SAFETY 4 "JUST KIDS"

*By Marilyn Adams*  
President Farm Safety 4 "JUST KIDS"



In the fall of 1986, Marilyn's 11-year old son, Keith, was killed in an accident on the family's Iowa farm. One year after her son's death, realizing that not enough was being done about farm safety, Adams began a campaign to promote education and awareness by distributing danger decals for gravity wagons through local FFA chapters. Recognizing the consuming public demand for farm safety information, she formed Farm Safety 4 "JUST KIDS" in October, 1987. The response from people nationwide has been phenomenal. Mail and phone calls from across the United States and Canada are received daily for farm safety information and merchandise available from the office. Materials available for sale are videos, decals, T-shirts, and other miscellaneous items. Farm Safety 4 "JUST KIDS" also compiles and distributes newsletters to members quarterly. The increased demand for information has prompted the formation of a Chapter Operations Department. This department is in the process of developing chapters across the United States. "If we are indeed concerned about making our farms safer places to work and live, we need to overcome the sort of conditioned apathy that exists today toward farm-related health and safety issues. By developing chapters of Farm Safety 4 "JUST KIDS", we are working to make further improvements in the communities. Education and building public awareness are perhaps the two most important elements in addressing this problem".

## ZOONoses—HUMAN HEALTH HAZARDS ASSOCIATED WITH ANIMALS

*By George W. Beran, D.V.M., Ph.D.*  
Iowa State University, Ames, Iowa



This presentation will represent teaching, research and personal experiences of the author. On one side, a chart identifying viral infections at greatest hazard of transmission from animals to people will be featured, accompanied by a photographic display on rabies. This will show the wild animals which maintain the infection, the disease in wild animals, farm livestock and companion animals. It will show preventive measures and an interactive section on myths and facts about rabies. (If available, a slide system or video monitor could be used to display additional, rare photographs of the disease in animals). On the reverse side of the display, a chart will identify bacterial infections at greatest hazard of transmission from animals to people. The illustrations will depict facets of Lyme disease, the way the disease is spread, the animals which carry it, the human disease, and measures for prevention. The display addresses health protection intervention in zoonoses, particularly from the viewpoint of the author as a consultant in rabies to the World Health Organization.

## TEACHING GUIDES AND CLIENT EDUCATION MATERIALS FOR CARDIOVASCULAR SCREENING PROGRAMS



*By Constance J. Betterley, M.S., R.D., Lorrie J. Graaf, R.N.*  
Iowa Department of Public Health, Des Moines, Iowa

Iowa's Cardiovascular Risk Reduction Screening and Education Program Recommendations advise that all screening programs provide client education. To assure that accurate, consistent information was given to Iowans at screening sites, staff from the Bureau of Nutrition and Health Promotion developed teaching guides for public health nurses and one-page fact sheets for the general public. The teaching guides and fact sheets correspond with the three components of the cardiovascular screening program: cholesterol screening, hypertension screening and diabetes screening. The teaching guides were developed in a standard format consisting of objectives, a suggested teaching outline, suggested background materials for the professional, and suggested client education materials. Information from the National Heart, Lung and Blood Institute and other public organizations was adapted to present a single concept per fact sheet and to lower the reading level. A formative evaluation was conducted using pre-testing methodology. The format may be useful for other states wanting teaching guidelines and client education at screening sites.

## OCCUPATIONAL HEALTH NURSES IN AGRICULTURAL COMMUNITIES -A PUBLIC HEALTH NETWORK FOR INJURY CONTROL



*By Elaine DeBoef, R.N., M.S., and other project nurses*  
Division of Disease Prevention, Iowa Department of Public Health, Des Moines, Iowa

Agriculture is a major component of the Iowa economy. Much of the food and fiber upon which America and the world depends is produced on Iowa farms. The Iowa farm lifestyle embodies many qualities which underlie the strong foundation of our country. Partly influenced by these factors, this population has been affected by occupational-related disease and injury at rates which greatly exceed public health standards. The Occupational Health Nurses in Agricultural Communities Project, funded by NIOSH, through the Division of Disease Prevention, Iowa Department of Public Health will extend surveillance and target injury and disease control interventions through collaborative efforts with local health and lay service groups. Early efforts will be directed toward injury intervention development in regions and communities which are identified as high frequency, high severity areas for agriculture-related acute injury, using 1990 surveillance data from the Sentinel Project Researching Agricultural Injury Notification Systems (SPRAINS) program based in Iowa.

## **A STATE PUBLIC POLICY TO IMPROVE FARM HEALTH AND SAFETY: IOWA'S CENTER FOR AGRICULTURAL SAFETY AND HEALTH**



*By Kelley J. Donham, D.V.M.*  
University of Iowa, Iowa City, Iowa

The 1990 Iowa Legislature passed a bill to form The Iowa Center for Agricultural Safety and Health (I-CASH). This unique program mandates that the College of Medicine (The University of Iowa), the land grant school (Iowa State University), the State Department of Health, and the Department of Agriculture and Land Stewardship work together to coordinate and focus resources to decrease agricultural occupational deaths, injuries, and illnesses. The Center is housed at The University of Iowa. The day-to-day operation is through the leadership of the Director, with strong input from the Coordinating Committee, which is made up of representatives from each of the participating institutions. The Coordinating Committee receives policy direction and has direct contact to the clientele through an 18-person Advisory Committee. This committee consists of active farmers, members of farm constituency groups (such as Farm Bureau, Corn Growers and Iowa Pork Producers), rural physicians, rural hospitals, and agribusinesses. This first-of-its-kind organization has put together a powerful, eclectic group of farm health and safety experts and clientele groups to develop and carry out preventive programs in a positive participatory manner. I-CASH has focused on five major areas to direct the energy and resources of this group. These are: 1) developing a network of hospitals in the state to provide comprehensive occupational health services for farm families; 2) prevention of respiratory diseases in swine producers; 3) prevention of injuries in farm children; 4) prevention of injuries involving tractors; and 5) surveillance of farm injuries. I-CASH has enjoyed excellent cooperation among the members. A major initial function is to coordinate the various preventive programs in the state that have emerged through the 1990 NIOSH initiative. I-CASH will also provide additional general programs to meet the needs of the farm families and farm workers of Iowa. I-CASH may serve as a model for other states as they develop public policies on this issue.

## IOWA AGRICULTURAL HEALTH AND SAFETY SERVICE PROGRAM



*By Jane Gay, B.S.N.*  
University of Iowa, Iowa City, Iowa

Farming is consistently ranked as one of the top three most hazardous occupations. An estimated 200,000 farmers are disabled and an additional 2,000 die annually from work-related causes. The farm family lives in and works at a worksite filled with many hazards. In other industries, comprehensive occupational health and safety services have been dramatically successful in reducing job-related injuries and illness. Effective systems to deliver this type of service in agriculture have not been established. In 1987, The Institute of Agricultural Medicine and Occupational Health of the University of Iowa College of Medicine initiated a pilot project for families and agribusiness in the state of Iowa. The project has expanded into a state network of agricultural occupational health and safety services based in community hospitals. The Iowa Agricultural Health and Safety Services Project (IA-HASSP) provides a unique clinic model and implementation plan, technical assistance and health professional training to community hospitals that are establishing agricultural occupational health and safety clinics. This model utilizes the community hospital as the primary integrator of existing community health services and direct provider of new occupational health services. The clinic will coordinate with regional primary-level hospitals and healthcare providers to deliver services at satellite sites. The service for members includes: occupational health screening, intensive occupational health and safety education, on-farm hygiene/safety analysis of identified or potential farm-related health and safety hazards, and availability of personal protection equipment. The project also provides service at the state level through telephone consultations for local-level healthcare providers.

## **CARBON MONOXIDE: VENTING PROBLEMS FROM HEATING APPLIANCES**



*By Thomas H. Greiner, Ph.D., Jim Cain*  
Iowa State University, Ames, Iowa

Excessive house depressurization can result in combustion appliance venting failure and contamination of household air. Three Iowa homes previously indicating combustion venting failure were instrumented and monitored to verify and further quantify venting failure and associated air quality deterioration.

Significant findings of this study included:

- Thermocouple located in the appliance vent and at the dilution device gap can accurately monitor venting performance.
- Carbon monoxide can reach dangerous concentrations under conditions of excessive spillage and exhaust recirculation in low-volume rooms.
- Neither carbon monoxide nor carbon dioxide concentration gives an accurate indication of flue gas spillage in large-volume mechanical rooms.
- Faulty vent design and/or maintenance can result in venting failure without the added aggravation of house depressurization.

## RADON IN IOWA

*By Thomas H. Greiner, Ph.D., Jim Cain*  
Iowa State University, Ames, Iowa



Radon is the second leading cause of lung cancer in the United States. The United States Environmental Protection Agency (EPA) prediction is that radon in homes causes 21,600 annual deaths, with an uncertainty range of 8,400 to 43,200 (USEPA 1989). The EPA began to test homes for radon, but did not include Iowa because the state was judged to be the state "least" likely to have a radon problem. Although Iowa was not identified by the EPA as a state with a potential radon problem, survey data collected in 1984 by a local college professor, Conrad Weiffenbach, found several high levels in eastern and central Iowa (Weiffenbach, 1987). To help determine if there were a radon problem, Iowa State University, in February of 1987, began selling radon detectors and collecting data on the radon results. This database now includes information on 15,111 short-term tests, including 7,100 first-time screening tests. The arithmetic average of these 7,100 first-time tests is 8.3 picocuries per liter (pCi/l), more than twice the EPA action guideline of 4.0 pCi/l. Thirty percent of the screening tests gave low results (4.0 pCi/l or less, 64 percent gave medium results (in the range of 4-20 pCi/l), and 6 percent were high readings (more than 20 pCi/l). Additional testing confirms that more than 70 percent of Iowa homes "fail" the EPA screening guidelines. Despite the risk associated with radon exposure, less than 6 percent of Iowa residents have tested for radon, and only a few hundred have taken measures to reduce the levels of radon in their homes. An Iowa State University Extension Service Iowa Radon Project public awareness survey in 1990-1991 reveals reasons for the disappointing response of the Iowa public. Nearly 90 percent have heard of radon, but they do not feel knowledgeable about radon, with two out of three persons reporting they feel inadequately informed.

## THE RURAL YOUTH DISABILITY PREVENTION PROJECT

By Cheryl Hawk, M.S., Jane Gay, B.S.N., Kelley J. Donham, D.V.M.  
University of Iowa, Iowa City, Iowa



The Rural Youth Disability Prevention Project is an intervention funded by the CDC in 1988 to provide a framework for the development of community-based, pediatric, agricultural injury-control programs. It has a three-stage structure, each requiring input from and feedback to the farm community to ensure that program development addresses its needs. The first stage is diagnosis of needs, with provisions for postintervention evaluation, utilizing two instruments: a survey of local farm families to gather data on safety practices, risk factors and injuries, and the Farm Family Walkabout guidebook, a family activity designed to identify hazards on individual farms. In the current project year, the survey was administered to 400 and the Walkabout to 458 Iowa farm families. Results indicated injury-control issues to target:

1. Children in the workplace. Children accompany their parents operating farm machinery from an average age of 7 and begin operating it themselves by 11.
2. Emergency preparedness. Only 25 percent of adults have had CPR/First Aid training. Fifty percent have First Aid kits in their homes, and 14 percent have them in their tractors.

In the second stage, communication, these findings are sent as a newsletter to participants and publicized in local media. Meetings ensue at which farm families and community groups assess local needs. This leads to the third stage, facilitation of appropriate actions. The specific issues currently targeted are being addressed on two levels, individual and community-based. On the individual level, Future Farmers of America groups are working directly with participants to implement simple, practical safety projects, such as preparing and selling tractor first aid kits or distributing lists of emergency phone numbers. An example of community-level action carried out was a CPR workshop requested by farm families after they received the report of the Walkabout data and arranged by local health professionals. Post-testing to assess behavior changes will be carried out in June of 1991. Evaluation of the efficacy of this community-oriented program will be completed by the fall of 1991.

## TRACTOR STABILITY: HOW STEEP IS TOO STEEP?

*By Jill Hudson, Charles Schwab, Ph.D.*  
Iowa State University, Ames, Iowa



Tractor-related fatalities in Iowa account for approximately 41 percent of the total fatalities recorded during 1988 through 1990. During 1991, fifty-two percent of all tractor fatalities recorded in Iowa during 1990 resulted from side overturns. These state figures coincide with national statistics, making tractor overturns a major agent of death for agricultural workers. What slope is too steep for safe operation of a tractor becomes an important issue. Static stability of farm tractors in side overturns on sloped terrain can be determined from the Static Lateral Critical Angle (SLCA). The SLCA was calculated for approximately 700 two-wheel drive models using the center of mass and geometry of the tractor. The SLCA was plotted with respect to the horsepower capacity of the tractors. The influence of different attachments on the SLCA was examined. The effect that a front-end loader carrying a hay bale at different elevations had on the SLCA were determined. Changes of the SLCA with respect to horsepower requirements were developed for the different attachments investigated. Understanding the influence that attachments have on the SLCA provides background information required for a proactive assessment of potential tractor side overturn hazards.



## PESTICIDE SAFETY FOR RURAL FARM YOUTH

By Nancy Jensen, Wendy Wintersteen  
Pocahontas County Extension



Spraying weeds with herbicides while riding on a tractor-propelled platform or bean-bar is a common summer job for many rural youths in the Midwest. However, bean-bar riders are exposed to more than the sun; they are also exposed to the herbicide spray. A study conducted by *Successful Farming* magazine indicated that virtually all bean-bar riders are contaminated with herbicide after 2 hours of spraying. Herbicide exposure can result in adverse health effects such as eye and skin damage and the possibility of future health problems. The severity of these effects depends on the type and concentration of the herbicide and the area and amount of exposure. To educate rural youth about herbicide dangers, Iowa State University Cooperative Extension staff conducted an extensive bean-bar education program in Calhoun and Pocahontas counties. In cooperation with the local public health department, copies of an Extension bulletin, *Bean-Bar Facts and Safety Tips* were distributed to 4,000 students in 14 school districts. In addition, a slide set on bean-bar safety was developed and presented by Extension personnel at several programs. Rural youths are taught that bean-bar spraying can be relatively safe when certain precautions are taken. Wearing rubber gloves, shoes, jeans and a long-sleeved shirt were emphasized as adequate protection for bean-bar riders in most cases. Goggles, rubber gloves, and Tyvek disposable coveralls will offer the maximum protection. In case of an emergency, youth were told to flush out irritated eyes or to rinse skin with large amounts of water. After work, all bean-bar riders should shower with soap and water. Bean-bar riders were cautioned against "horsing around" and inadvertently spraying themselves or others with herbicide. And finally, youth learned to refuse to spray until all the equipment was safe to operate.

## IOWA AGRICULTURAL INJURY SURVEILLANCE

By Shirley K. Jones, B.S.N., M.P.H.  
Iowa Department of Public Health, Des Moines, Iowa



Acute agricultural injury is recognized by the National Safety Council as occurring at a rate of nearly five times the rate for all industry. Iowa's Sentinel Project Researching Agricultural Injury Notification Systems (SPRAINS) Project, funded by CDC/CEHIC, has established a statewide surveillance system to study acute agriculture-related injury. The project now in its second year uses reports from designated hospital sentinel reporters and from other volunteer health care providers and seeks to identify the multiple factor relationships which occur in acute injuries subsequent to agriculture activity. More than 2,100 acute injuries, including 83 deaths, occurred and were reported in 1990. Information characterizing these injuries from the first year of study will be presented in our display. Injury is increasingly being recognized as a high priority public health problem. Continuing analysis of this data will enable the design of activities that can be specifically targeted to decreasing the frequency and severity of these injuries.

## AGRICULTURAL RESPIRATORY HAZARDS EDUCATION SERIES



By Bonnie J. Kay, R.N., B.S.N.  
American Lung Association of Iowa, Des Moines, Iowa

The *Agricultural Respiratory Hazards Education Series* (ARHES) was produced in 1986 by the American Lung Association of Iowa (ALAI) in response to a profound lack of comprehensive material addressing the lung health risks associated with agriculture. The series was developed in collaboration with the University of Iowa's Institute of Agricultural Medicine and Occupational Health and Iowa State University Extension. It consists of an introduction and a nine unit set for health professionals and a nine unit companion set for agricultural and community workers. Each unit is designed to stand alone. Each addresses a different lung hazard commonly found in agriculture. The series provides an excellent cornerstone for community education programs. The materials have been used by extension services and lung associations across the country. Rural hospitals have used the series for community programs, as have Farm Bureau Federations, 4-H, and FFA youth groups, health fairs, producer groups and farm safety organizations. Programs for physicians, nurses, and respiratory therapists have been very successful and have generated much interest. The ALAI has a slide/tape presentation which accompanies the series and provides a good discussion tool. It has also developed a promotional kit for other organizations and lung associations to use. The kit includes press releases timed to seasonal tasks and hazards, public service announcements, public service ads, sample program outlines, and accompanying letters. A new tabletop display which addresses proper selection and use of respirators is now available for groups to use. The nature of the education series allows each user to tailor the program to the specific need. It can be provided at the community level, directed by local healthcare providers or extension personnel, or used strictly by the individual. Cost is minimal. An opportunity to display in the project showcase will permit others to see how the ARHES can complement their programs. We would provide a display presentation.

## **INNOVATIONS AND PERCEPTIONS OF AGRICULTURAL SAFETY STUDENTS**



*By C.J. Lehtola, M.S.*  
Iowa State University, Ames, Iowa

People involved in agriculture recognize agricultural safety as a present-day vital concern. Farmers, agribusiness employees, and extension personnel expressed the desire and need to learn more about farm safety. Many of these individuals are employed full-time and unable to attend conventional campus classes. A class in agricultural safety was offered as an off-campus program for these adult undergraduate and graduate-level students as a solution. The course was conducted using 13 2-hour video segments and 2 all-day, on-campus sessions. A total of 68 students (ages 22-62) participated in the first class that was offered. Students were required to identify hazards at their farm or workplace and develop a solution to eliminate hazards. Many found it effective to conduct the hazard identification by video camera. Many innovative solutions were developed and presented by the students. Farm safety issues included licensing of tractor operators on public roadways, child endangerment, babysitting services, regulations, disability awareness and the responsibility of manufacturers. Their awareness of safety was increased, as well as the recognition of the complexities involved in farm safety. This course proved applicable and valuable to the participants. Measurement of the accidents that were prevented as a result of their involvement, innovation and increased awareness is impossible, but the participants responded favorably to the class and many students plan to promote farm safety in their communities.

## AGRICULTURAL CHEMICALS: ACUTE AND CHRONIC EXPOSURES



By Linda L. Leverenz, M.S., C.H.E.S., Patricia Price, D.O.  
University of Iowa, Iowa City, Iowa

The Agency for Toxic Substances and Disease Registry (ATSDR) has recognized the need for educating health professionals throughout the nation on the importance of properly diagnosing and treating various environmental illnesses. To assist in meeting this need, ATSDR has provided funding through the Iowa Department of Public Health to the University of Iowa for the development of a 2-hour physician education program entitled, *"Agricultural Chemicals: Acute and Chronic Exposures"*. It has been estimated that this program has reached approximately 52 percent of the physicians in the state of Iowa. Agricultural chemicals are used in every aspect of daily life. Pesticides control insects in agricultural settings, destructive moths and beetles in forests, and garden and household pests. Other chemicals eliminate weeds, serve as preservatives in wood products, and are used as fertilizers. The widespread use of these chemicals often results in overexposures that may cause "flu-like" symptoms and are somewhat difficult to diagnose. Major effects on human health may result in acute systemic poisoning; skin, eye, and nose irritation; dermal sensitization; pulmonary damage; and, to a lesser extent, chronic damage to the kidney, liver, and central nervous system. Objectives of this program are to provide information that will assist physicians in: 1) identifying pesticides that are responsible for acute and chronic health effects; 2) establishing clinical diagnostic and treatment protocols; and 3) offering their patients methods for preventing pesticide poisonings.

## PREVALENCE OF ANTIBODIES TO ENVIRONMENTAL FUNGI IN THE SERA OF SWINE CONFINEMENT



By Daniel M. Lewis, Ph.D., Toni A. Bledsoe, Amy Stasny, Lisa Nicklow  
Immunology Section, NIOSH, Morgantown, West Virginia  
Kelley Donham, D.V.M.

Institute of Agricultural and Occupational Health, University of Iowa, Iowa City, Iowa

As part of an epidemiological analysis of the respiratory hazards associated with working in swine-confinement facilities, we obtained serum samples from 292 persons who either work in swine-confinement facilities, farmers not engaged in swine production, or age-matched, non-farm workers. Environmental analyses of swine confinement facilities revealed six species of fungi were the predominant fungal isolates in these facilities. The sera were assayed for precipitating antibodies (IgG) by counterimmuno-electrophoresis (CIEP) and reagenic antibodies (IgE) by a radioallergosorbent test (RAST) to extracts of the fungal isolates. The fungal isolates were *Scopulariopsis sp.*, *Penicillium sp.*, *Cladosporium sp.*, *Mucor sp.*, *Aspergillus ochraceous.*, and *Aspergillus flavum*. Only two of the serum samples contained precipitating antibodies and both were reactive with the *Mucor sp.* isolate. In contrast, 46 of the 292 sera (15.7%) contained IgE antibodies to one or more of the fungal isolates. These results will be presented and discussed with respect to the exposure status of the workers, but the preliminary analysis indicates that IgE antibodies may be a more sensitive marker of exposure to these microorganisms than precipitating antibodies.

## HEALTH SURVEILLANCE ACTIVITIES OF A VETERINARY DIAGNOSTIC LABORATORY

*By Gary D. Osweiler, D.V.M., M.S., Ph.D.*  
Iowa State University, Ames, Iowa



Food and companion animals are often exposed more directly to environmental chemicals than are humans, and may serve as sentinels of potential health effects in humans. Recently, the National Academy of Sciences has recognized and reinforced this idea. Prompt investigation of animal losses or illnesses may determine that a poisoning has occurred and allow preventive measures before they become widespread in humans or the environment. In some circumstances, animals studied at questionable locations, such as hazardous waste sites or industrial locations, may provide early clues well before human problems become apparent. Toxic effects of chemicals may alter functions of cells, cause morphologic changes, or act on individual cellular components important to the immune system. Veterinary diagnostic laboratories are an important link in the assessment of potential human problems of toxicosis, immune dysfunction and carcinogenesis by their ability to evaluate immune function in exposed animals, as well as correlate the morphologic effects and concentration of chemicals that result from exposure to pollutants in the environment of both animals and man. The Iowa State University Veterinary Diagnostic Laboratory has evaluated numerous potential human problems by monitoring key effects in animals at risk. Some of these problems include lead poisoning, organophosphate toxicosis, dioxin hazards in wood preservatives, water quality, aflatoxicosis, and therapeutic drugs. Details and significance of these activities relative to human health will be discussed.

## IOWA FARM FAMILY HEALTH AND HAZARD SURVEILLANCE PROJECT



*By William J. Popendorf, Ph.D.*  
University of Iowa, Iowa City, Iowa

Agriculture is now recognized as the most hazardous workplace in America. Yet agriculture lags behind general industry in the application of the traditional preventive phases of recognition, evaluation and control of health (and safety) hazards. The dilemma of agriculture as both an industry and a way of life contributes not only to this lag but also influences the design and approach of a successful health survey of an agricultural population. The aims and approach of the National Institute for Occupational Safety and Health [NIOSH] funded Iowa Farm Family Health and Hazard Surveillance Project are:

1. To determine the retrospective distribution of farming practices, medical symptoms, and traumatic injuries from a randomly selected cohort of farming families using a mailed survey questionnaire to a population-based, random cohort on about 500 farms.
2. To record temporal exposure to environmental and biomechanical/ergonomic factors likely to contribute to work-related illness or injuries by on-farm observations of a sub-cohort of these farming families.
3. To measure the levels of exposure to a small number of selected low-frequency, high-hazard agents or processes likely to contribute to work-related illness using traditional quantitative industrial hygiene assessment techniques.

Data collected in this survey will provide the basis for future investigative agricultural health and safety efforts in several directions. The health status data will comprise the first systematic, representative view of the health of American farmers and farm families. Hazard data will provide not only a statistical distribution of risk factors within this population, it will also contain a basis upon which to estimate the time or frequency of being "at-risk," yielding new insight into interpreting accident, injury and fatality data collected in these and other studies. Additionally, these data will be used to develop specific recommendations for modifications of tools, machinery, work methods and buildings which will reduce work-related injuries among this segment of the population.

## **IOWA STATE UNIVERSITY: RESEARCH AND INFORMATION FOR SAFETY AND HEALTH**



*By August Ralston*  
Iowa State University, Ames, Iowa

Illustrated are the research undertaken and information and services provided by the Cooperative Extension Service (CES) at Iowa State University in the area of agricultural safety and health. The structure of the CES including 4-H, and how farm families and workers and safety and health professionals can access information from the CES are explained. Research/information topics covered are clothing contamination by chemicals, application of chemicals, household use of pesticides, rollover protective structures, quality of water supply, carbon monoxide spillage from heating equipment, air quality and respiratory illness, design of confinement buildings, machinery design, and tractor stability.

## **AGRICULTURAL HEALTH PROMOTION SYSTEMS: OBJECTIVES AND PROGRAMS IN IOWA**



*By August Ralston*  
Iowa State University, Ames, Iowa

Illustrated are the objectives and plan of action under the Agricultural Health Promotion Systems (AHPS) cooperative agreement between NIOSH and Iowa State University. Efforts to enhance the capability of professional extension staff as interveners for occupational safety and health, to build a network among public health agencies, volunteer groups, and cooperative extension, to cooperate with the Center for Agricultural Research, Education, and Disease and Injury Prevention at the University of Iowa, and to improve the formal occupational safety and health college curriculum are explained. Examples are provided of the likely impact of the AHPS cooperative effort on educational programs and intervention techniques and networks that are aimed at reducing the occupational hazards and exposures faced by farm families and workers.



## RURAL YOUTH DISABILITY PROJECT

By Angie Reynolds, R.D.H., B.S.  
Iowa Department of Public Health, Des Moines, Iowa



Health and safety are major problems in agriculture. When a farm injury results in a child affected by a disability, the rural community is impacted socially and economically. Farm injuries and the resulting disabilities consequently become a major public health problem. The Rural Youth Disability Prevention Project focuses on increasing community awareness and ownership of the farm-child injury problem. This is a necessary focus for any effective and on-going *community-based* prevention strategy. The project is owned, operated, and directed by the community with technical assistance provided by the Office of Disability Prevention and the University of Iowa Hospital and Clinics. These community prevention projects have been implemented by the Disability Prevention Program. Each project is operated locally and focuses on unique disability risk factors. The project sites are located in Marshalltown, Spencer, and Harlan. These communities were selected due to their affiliation with the Iowa Agricultural Health and Safety Service Project (IA-HASSP). The IA-HASSP project also serves to focus community awareness, ownership, and cooperative efforts in reducing farm-related health and safety hazards. The goal of this project is to demonstrate that disabilities of rural youth can be reduced through concerted community-wide efforts. Three major activities conducted include:

- Community survey of existing safety knowledge, attitudes, behavior and near-miss injuries.
- Farm family hazard analysis ("Walkabouts").
- Community Involvement Injury Control Workshop.

Special emphasis is placed on the development of effective community prevention strategies which involve organizing broad community influence and support. To accomplish this, the project will promote active collaboration between multiple disciplines, agencies, and businesses in the projects.